Serial No. 10/505,479
Docket No. 28951.5338

IN THE SPECIFICATION:

Please replace the paragraph beginning on page 10, line 21 with the following:

Moreover, an information disk recording/reproducing device according to claim 3 of the present invention is the information disk recording/reproducing device according to claim 1 or 2. In each of the areas divided into m divisions, a difference between the counted value at the first rotational speed and the counted value at each of the second, third~~, ...~~ through m rotational speeds is expressed by the ~~equation below:~~ terms DAT[1] through DAT[m].

~~DAT [1] ~ DAT [m]~~

~~(Equation 18)~~

~~a~~ A vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} | DAT[x] |$$

(Equation ~~19~~ 18)

and a value proportionate to the vibration quantity is used as a vibration detection value.

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Please replace the paragraph beginning on page 11, line 11 with the following:

Further, an information disk recording/reproducing device according to claim 4 of the present invention is the information disk recording/reproducing device according claim 1 or 2. In each of the areas divided into m divisions, a difference between the counted value at the first rotational speed and the counted value at each of the second, third~~, ...~~ through m rotational speeds is expressed by the ~~equation below:~~ terms DAT[1] through DAT[m].

~~DAT [1] ~ DAT [m]~~

~~(Equation 20)~~

~~a~~ A vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} | DAT[x] | \qquad \text{(Equation } \cancel{21}\ 19)$$

a value proportionate to the vibration quantity is used as a vibration detection value, and the m divisions for one rotation is determined within a permissible error range based on the maximum value of an error relative to an actual vibration quantity at this point, the maximum value being expressed by the equation below:

$$\text{ERROR} \leq 1 - \cos\frac{\pi}{m} \qquad \text{(Equation } \cancel{22}\ 20)$$

Please replace the paragraph beginning on page 12, line 12 with the following:

Further, an information disk recording/reproducing device according to claim 5 of the present invention is the information disk recording/reproducing device according to claim 1 or 2. In each of the areas divided into m divisions, a difference between the counted value at the first rotational speed and the counted value at each of the second, third~~, ...~~ through m rotational speeds is expressed by the ~~equation below:~~ terms DAT[1] through DAT[m].

~~DAT [1] ~ DAT [m]~~

~~(Equation 23)~~

~~a~~ A vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} |DAT[x]| \qquad \text{(Equation } \cancel{24}\ 21\text{)}$$

a value proportionate to the vibration quantity is used as a vibration detection value, and the m divisions for one rotation is set at 24 so that an error relative to an actual vibration quantity at this point has a maximum value of 1% or less.

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Please replace the paragraph beginning on page 16, line 19 with the following:

A method for controlling a recording/reproducing speed of an information disk recording/reproducing device according to claim 8 of the present invention is the method for controlling a recording/reproducing speed of the information disk recording/reproducing device according claim 6 or 7. In each of the areas divided into m divisions, a difference between the counted value at the first rotational speed and the counted value at each of the second, third~~, ...~~ through m rotational speeds is expressed by the ~~equation below:~~ terms DAT[1] through DAT[m].

~~DAT [1] ~ DAT [m]~~

~~(Equation 25)~~

~~a~~ A vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} |DAT[x]|$$

(Equation ~~26~~ 22)

and a value proportionate to the vibration quantity is used as a vibration detection value.

Please replace the paragraph beginning on page 17, line 3 with the following:

Further, a method for controlling a recording/reproducing speed of an information disk recording/reproducing device according to claim 9 of the present invention is the method for controlling a recording/reproducing speed of the information disk recording/reproducing device according claim 6 or 7. In each of the areas divided into m divisions, a difference between the counted value at the first rotational speed and the counted value at each of the second, third~~, ...~~ through m rotational speeds is expressed by the ~~equation below:~~ terms DAT[1] through DAT[m].

$\cancel{DAT[1] \sim DAT[m]}$

~~(Equation 27)~~

~~a~~ A vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m}|DAT[x]| \quad \text{(Equation } \cancel{28}\ \underline{23}\text{)}$$

a value proportionate to the vibration quantity is used as a vibration detection value, and the m divisions for one rotation is determined within a permissible error range based on the maximum value of an error relative to an actual vibration quantity at this point, the maximum value being expressed by the equation below:

$$\text{ERROR} \leq 1-\cos\frac{\pi}{m} \quad \text{(Equation } \cancel{28}\ \underline{24}\text{)}$$

Please replace the paragraph beginning on page 18, line 6 with the following:

Moreover, a method for controlling a recording/reproducing speed of an information disk recording/reproducing device according to claim 10 of the present invention is the method for controlling a recording/reproducing speed of the information disk recording/reproducing device according claim 6 or 7. In each of the areas divided into m divisions, a difference between the counted value at the first rotational speed and the counted value at each of the second, third~~, ...~~ through m rotational speeds is expressed by the ~~equation below:~~ terms DAT[1] through DAT[m].

~~DAT [1] ~ DAT [m]~~

~~(Equation 30)~~

~~a~~ A vibration quantity at this point is approximated by the equation below:

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} |DAT[x]| \quad \text{(Equation } \cancel{31}\ 25\text{)}$$

a value proportionate to the vibration quantity is used as a vibration detection value, and the m divisions for one rotation is set at 24 so that an error relative to an actual vibration quantity at this point has a maximum value of 1% or less.

Please replace the paragraph beginning on page 25, line 20 with the following:

Counted value data obtained at the first rotational speed where one rotation is divided into six areas, m=6, is expressed by the terms DAT1[1] through DAT1[6] ~~equation below~~.

~~DAT[1]~DAT[m]~~

~~(Equation 32)~~

Please replace the paragraph beginning on page 26, line 20 with the following:

The control unit 116 controls the disk rotating unit 103 to make a rotation at 4000 rpm. Similarly, the radius direction driving unit 109 is made non-operational. Then, track crossing is caused by an eccentric component + a vibration component between the tracks of the information disk 102 and the reading unit 104. Thus, the counted value of the counting unit 115 is obtained with the code indicating a track cross direction based on the output of the rotational position information output unit 114 for each of the areas obtained by dividing one rotation into six. The obtained counted ~~value is expressed by the equation below~~ values for the second rotational speed where one rotation is divided into six areas, m=6, is expressed by the terms DAT2[1] through DAT2[6].

~~DAT[1]~DAT[m]~~

~~(Equation 33)~~

Please replace the paragraph beginning on page 26, line 20 with the following:

The data of each area is expressed by the equation below. The terms DAT1[1] through DAT1[6] are the counted value data obtained at the first rotational speed where one rotation is divided into six areas, m=6. The terms DAT2[1] through DAT2[6] are the counted value data obtained at the second rotational speed where one rotation is divided into six areas, m=6. For instance, DAT2[3] is the counted value data of the second rotational speed in the third angular division. The terms DAT1[1] through DAT1[6] are shown by the curve LOW SPEED ROTATION (ECCENTRICITY COMPONENT) shown in FIG. 4. The terms DAT2[1] through DAT2[6] are shown by the curve HIGH SPEED ROTATION (ECCENTRICITY + VIBRATION COMPONENT) shown in FIG. 4. The terms DAT[1] through DAT[6] are the counted value data corresponding to the VIBRATION COMPONENT and are determined from the equation below. Subtracting DAT1[1] from DAT2[1] produces the counted value data corresponding to the VIBRATION COMPONENT of DAT[1].

$$
\begin{aligned}
DAT[1] &= DAT2[1] - DAT1[1] \\
DAT[2] &= DAT2[2] - DAT1[2] \\
DAT[3] &= DAT2[3] - DAT1[3] \\
DAT[4] &= DAT2[4] - DAT1[4] \\
DAT[5] &= DAT2[5] - DAT1[5] \\
DAT[6] &= DAT2[6] - DAT1[6]
\end{aligned}
$$

(Equation ~~34~~ 26)

To be precise, based on the data, vibration amplitude is expressed by the equations below.

$$\text{VIBRATION} \quad \cancel{\text{VIBRATIN}}\ \text{AMPLITUDE}\ 1[n] = \frac{2}{\sqrt{3}}\sqrt{\left|DAT[n]^2 + DAT[n]DAT[n+1] + DAT[n+1]^2\right|}$$

(Equation ~~35~~ 27)

$$\text{VIBRATION AMPLITUDE 2 } [n] = \frac{2}{\sqrt{3}}\sqrt{\left|DAT[n]^2 - DAT[n]DAT[n+2] + DAT[n+2]^2\right|}$$

(Equation ~~36~~ 28)

(when n = 1 to 6 and n > 6, n = n – 6 is established).

Please replace the paragraph beginning on page 26, line 20 with the following:

In order to prevent an increase in the number of calculating steps, approximation is performed in a simplified manner by the equation below.

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{6}|DAT[x]|$$

(Equation ~~37~~ 29)

Please replace the paragraph beginning on page 33, line 9 with the following:

Counted value data obtained at the first rotational speed where one rotation is divided

into six areas, m=6, is expressed by the terms DAT1[1] through DAT1[6] ~~equation below~~.

~~DAT [1] ~ DAT [m]~~

~~(Equation 38)~~

Please replace the paragraph beginning on page 33, line 28 with the following:

The control unit 116 controls the disk rotating unit 103 to make a rotation at 4000 rpm. Similarly, the radius direction driving unit 109 is made non-operational. Then, track crossing is caused by an eccentric component + a vibration component between the tracks of the information disk 102 and the reading unit 104. Thus, the counted value of the counting unit 115 is obtained with the code indicating a track cross direction based on the output of the rotational position information output unit 114 for each of the areas obtained by dividing one rotation into six. The obtained counted ~~value is expressed by the equation below~~ values for the second rotational speed where one rotation is divided into twelve areas, m=12, is expressed by the terms DAT2[1] through DAT2[12].

~~DAT2 [1] ~ DAT2 [12]~~

~~(Equation 39)~~

Please replace the paragraph beginning on page 34, line 14 with the following:

The data of each region is expressed by the equation below. The terms DAT1[1] through DAT1[12] are the counted value data obtained at the first rotational speed where one rotation is divided into twelve areas, m=12. The terms DAT2[1] through DAT2[12] are the counted value data obtained at the second rotational speed where one rotation is divided into twelve areas, m=12. For instance, DAT2[12] is the counted value data of the second rotational speed in the twelfth angular division. The terms DAT1[1] through DAT1[12] are shown by the curve LOW SPEED ROTATION (ECCENTRICITY COMPONENT) shown in FIG. 6. The terms DAT2[1] through DAT2[12] are shown by the curve HIGH SPEED ROTATION (ECCENTRICITY + VIBRATION COMPONENT) shown in FIG. 6. The terms DAT[1] through DAT[12] are the counted value data corresponding to the VIBRATION COMPONENT and are determined from the equation below. Subtracting DAT1[1] from DAT2[1] produces the counted value data corresponding to the VIBRATION COMPONENT of DAT[1].

```
DAT [1] =DAT2 [1] -DAT1 [1]
DAT [2] =DAT2 [2] -DAT1 [2]
DAT [3] =DAT2 [3] -DAT1 [3]
DAT [4] =DAT2 [4] -DAT1 [4]
DAT [5] =DAT2 [5] -DAT1 [5]
DAT [6] =DAT2 [6] -DAT1 [6]
DAT [7] =DAT2 [7] -DAT1 [7]
DAT [8] =DAT2 [8] -DAT1 [8]
DAT [9] =DAT2 [9] -DAT1 [9]
DAT [10] =DAT2 [10] -DAT1 [10]
DAT [11] =DAT2 [11] -DAT1 [11]
DAT [12] =DAT2 [12] -DAT1 [12]
```

(Equation ~~40~~ 30)

Based on the data, vibration amplitude is approximated by the equation below.

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{12} | DAT[x] |$$

(Equation ~~41~~ 31)

By comparing a vibration detection value obtained by (equation ~~41~~ 31) with a predetermined threshold value, it is decided whether or not reproduction should be performed at the maximum rotational speed. Additionally, a vibration quantity obtained by (equation ~~41~~ 31) includes an error relative to a precise vibration quantity. The error will be described below.

Please replace the paragraph beginning on page 38, line 23 with the following:

Measurements are performed as the case where a total number of divisions is m for one rotation. The track cross data of a vibration component for each divided area where one rotation is divided into m areas is expressed by the terms DAT[1] through DAT[m] ~~equation below~~.

~~DAT[1]~DAT[m]~~

~~(Equation 42)~~

Based on the data, vibration amplitude is approximated by the equation below.

$$\text{VIBRATION QUANTITY} = \frac{1}{4}\sum_{x=1}^{m} |DAT[x]| \qquad \text{(Equation } \cancel{43}\ 32\text{)}$$

By comparing a vibration detection value obtained by (equation ~~43~~ 32) with a predetermined threshold value, it is decided whether or not reproduction should be performed at the maximum rotational speed.

Please replace the paragraph beginning on page 35, line 25 with the following:

Additionally, a vibration quantity obtained by (equation ~~43~~ 32) includes an error relative to a precise vibration quantity. The error will be described below.

Please replace the paragraph beginning on page 35, line 25 with the following:

As described in Embodiment 2, as the number of divisions increases for one rotation, a vibration quantity expressed by (equation ~~43~~ 32) has a smaller calculated error. However, the number of divisions for one rotation of a rotational position information output unit 114 is limited by hardware. The number of divisions is six or eight when an FG pulse is used.

Please replace the paragraph beginning on page 40, line 25 with the following:

The maximum error occurs when the m division for one rotation is an even number and the counting result is 0 in an area of the part where the track cross direction is reversed. At this point, since the number of divisions for one rotation is m, as shown in FIG. 8(b), regarding the number of traversed tracks before and after the track cross direction is reversed in the area, absolute values are expressed by the equation below.

$$A(1-\cos\frac{\pi}{m})$$

(Equation [[44]] 33)

Please replace the paragraph beginning on page 41, line 1 with the following:

Therefore, regarding an error of the number of traversed tracks for one rotation, a maximum value d is expressed by the equation below.

$$d = 4A(1 - \cos\frac{\pi}{m})$$

(Equation ~~45~~ 34)

A total number of traversed tracks for one rotation is expressed by the equation below.

$$\text{TORTAL NUMBER OF TRAVERSED TRACKS} = \int_0^{2\pi} A\,|\cos(\omega t)| = 4A$$

(Equation ~~46~~ 35)

Hence, a percentage of an error to the total number of traversed tracks is expressed by the equation below.

$$\frac{d}{\text{TOTAL NUMBER OF TRAVERSED TRACKS}} = 1 - \cos\frac{\pi}{m}$$

(Equation ~~47~~ 36)